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10/650,424

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Megan A. Fannon

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CESARI AND MCKENNA, LLP  
88 BLACK FALCON AVENUE  
BOSTON, MA 02210

EXAMINER

ECHELMEYER, ALIX ELIZABETH

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

12/14/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

**Application No.**

10/650,424

**Applicant(s)**

FANNON ET AL.

**Examiner**

Alix Elizabeth Echelmeyer

**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 September 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4, 6-14 and 21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-14 and 21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Response to Amendment*

1. This Office Action is in response to the amendment filed September 28, 2007. Claims 1-3, 6-11, 13 and 14 have been amended. Claim 21 has been added. Claims 1-4, 6-14 and 21 are pending and are rejected finally for the reasons given below.

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 21 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claim is drawn to the use of the raised surface of the current collector to prevent flashing in the mold. It is unclear how the current collector prevents flashing in the mold.

According to the *Injection Molding Handbook*, flash occurs when the pressure of the plastic is greater than that of the clamp hold (p. 908). A small amount of the plastic leaks into the areas where the parts of the mold meet, forming a thin web of material. Several solutions are listed, including adjusting controlling the viscosity of the plastic or the clamp force holding the mold parts together.

In Table 11-7, under the "Possible Remedy" section, concerning the mold ("make correction for"), it is suggested that something other than flash could keep the mold open, therefore causing flash between the mold plates. In this case, the raised surfaces of the current collector could certainly be too high for the mold, therefore keeping the mold from closing and causing flash between the mold plates.

For the purposes of examination, claim 21 will be interpreted to be drawn to a raised surface that prevents flashing by not being so high that it causes flashing to occur between the mold plates.

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-4, 6-14 and 21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Specifically, the limitation found in claims 1, 6, 7, 11 and 14 drawn to the raised surface of the current collector providing a minimum limit to the thickness of the components in the mold was not found by the examiner to be supported in the specification. The disclosure does discuss raised surfaces of the current collectors to prevent "flash" or prevent the gasket material from

getting onto the active areas, but it does not appear to discuss the raised surface of the current collector providing a minimum limit to the thickness of components in the mold.

For the purposes of examination, the examiner will interpret the "raised surface [providing] a minimum limit to the thickness of the components in the mold" as the raised surface being the point beyond which the components in the mold cannot extend.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-4, 7, 10-14 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pflaesterer (US 2003/0235744) in view of Fuglevand et al. (US Patent 6,030,718).

Pflaesterer teaches a sealing arrangement for fuel cells that is created by injection molding a seal to hold the deformable membrane electrode assembly (MEA) between a pair of separator plates (abstract, [0014], [0028]).

Pflaesterer further teaches that the sealing band holds the MEA in compression (abstract), since contact pressure is applied to the assembly during the formation of the seal ([0029]). Since the seal holds the components in compression, additional

mechanical clamps are omitted in this invention ([0044]). The compression of the mold inherently reduces the thickness of the components.

Additionally, Pflaesterer teaches that the sealing function is approximately equal in the middle and end regions of the stack ([0013]). Thus, the compression is even across the entire area, as required by the newly amended independent claims of the instant application.

The separators also serve as current collectors and sandwich the MEA ([0006], Figure 1).

As can be seen in Figure 2 of Pflaesterer, a separator (4) contains a raised area (adjacent 34). This raised surface limits the thickness of the gasket (24) since the gasket does not extend beyond the raised surface.

Regarding claim 4, Pflaesterer teaches injection molding the seal in the frame ([0014]).

With regard to the curing limitation (G) of claim 1, (H) of claim 6, (D) of claim 7, claim 10 and (I) of claim 11, it would be inherent to the invention of Pflaesterer to allow the seal to cure within the mold, since, if the seal was not cured before the mold was removed, it would not properly form.

As for the limitations to the membrane electrode assembly and catalysts, these are taught in Pflaesterer ([0046]), and should be known to one having ordinary skill in the art.

With further regard to claim 21, it can be seen in Figures 1 and 2 of Pflaesterer that flashing has not occurred in the molded seal around the current collectors. In

following with the interpretation of claim 21 discussed above, the raised surfaces of the current collectors of Pflaesterer are not so high that they prevent the mold from closing, thus preventing flashing.

Pflaesterer fails to teach leads on the current collectors and the hot pressing step of claim 11.

Fuglevand et al. teach current collector plates having conductive members that extend beyond the outer frame of the plate. These conductive members are received in the outer wall of the fuel cell container for easier conduction of electrical energy generate by the fuel cell. Fuglevand et al. further teach the coating of a diffusion layer on the current collector plate for maintaining electrical contact (Figure 18; column 20 lines 39-67; column 21 lines 1-41). Fuglevand et al. further teach a hot pressing step prior to sealing the components of the fuel cell (column 17 lines 65-67; column 18 lines 1-6).

It would be advantageous to use the leads taught by Fuglevand et al. on the current collector plates of Pflaesterer, as well as the diffusion layer of Fuglevand et al., in order to facilitate the conduction of the electricity produced by the fuel cell.

In this case, the current collector with leads is interpreted to be a lead frame with integrated current collector since the integrated part is a structure designed for giving support to the rest of the components of the fuel cell.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the current collector with leads as taught by

Fuglevand et al. as well as the diffusion layer as the current collector of Pflaesterer in order to make the conduction of electricity produced by the stack more efficient.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pflaesterer in view of Fuglevand et al. and Draper et al. (US 5,273,838).

The teachings of Pflaesterer and Fuglevand et al. as discussed above are incorporated herein.

Pflaesterer in view of Fuglevand et al. teach a method for forming a fuel cell having a lead frame, with the components sealed in a state of compression (see above).

Pflaesterer in view of Fuglevand fail to teach a fuel cell array.

Draper et al. teach a fuel cell array, wherein each cell in the array is electrically connected by metallic connectors, corresponding to leads of the instant application (abstract).

Draper et al. further teach that having a fuel cell array with the cells connected by leads allows for greater row voltage and for better access of the anodes to fuel flow (column 2 lines 1-6).

It would be advantageous to use the method of Pflaesterer in view of Fuglevand et al. to create an array of fuel cells having lead frames such as taught by Draper et al., with the components sealed in a state of compression, since such a fuel cell array would have greater row voltage and good fuel access for the anodes.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made use the method of Pflaesterer in view of Fuglevand et

al. to create an array of fuel cells having lead frames such as the array of Draper et al., with the components sealed in a state of compression, since such a fuel cell array would have greater row voltage and good fuel access for the anodes.

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pflaesterer in view of Fuglevand et al. as applied to claim 7 above, and further in view of Montminy et al. (US 2004/0211668).

The teachings of Pflaesterer and Fuglevand et al. as discussed above are incorporated herein.

Pflaesterer in view of Fuglevand et al. fails to teach the use of welding to <sup>connect</sup>~~collect~~ components. A1  
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Montminy et al. teach the fabrication of a membrane electrode assembly including an anode, polymer electrolyte membrane (PEM), cathode, and flow field plates that can also serve as current collectors integrated by injection molding using a thermoplastic elastomer ([0091]-[0094]). In one embodiment, the material can be injected directly to a space within the flow field plates, but Montminy et al. also teach the use of mold plates as seen in Figure 2.

Montminy et al. also teach the use of welding to connect components ([0096]).

It would be desirable to use welding to connect components of Pflaesterer in view of Fuglevand et al. since it is well known in the art that welding is a sufficient means for connecting components, especially metal components, since it ensures that the components are secured.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use welding to connect components of Pflaesterer in view of Fuglevand et al. since it is well known in the art that welding is a sufficient means for connecting components, especially metal components, since it ensures that the components are secured.

10. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pflaesterer in view of Fuglevand et al. as applied to claim 7 above, and further in view of Roche et al. (US Patent Number 5,097,104).

The teachings of Pflaesterer and Fuglevand et al. as discussed above are incorporated herein.

Pflaesterer in view of Fuglevand et al. fails to teach trimming excess material from the lead frame after forming the membrane electrode assembly.

Roche et al. teach the trimming of excess material from the current collector after the pressing operation to seal the components of the fuel cell. Trimming excess material is necessary in order to remove excess material (column 8 lines 16-38).

It would be desirable to trim excess material from the lead frame of Pflaesterer in view of Fuglevand et al. in order to remove excess material.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to trim excess material from the lead frame in order to remove unneeded material.

***Response to Arguments***

11. Applicant's arguments have been considered but are moot in view of the new ground of rejection, see above. The arguments pertain to the amendments to claims 1, 6, 7, 11 and 14 adding the limitation to a raised surface on the current collector, where the raised surface provides a minimum limit to the thickness of components in the mold.

***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is 571-272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alix Elizabeth Echelmeyer  
Examiner  
Art Unit 1795

aee

  
SUSY TSANG-FOSTER  
SUPERVISORY PATENT EXAMINER